THE DISPOSAL OF PHARMACEUTICAL WASTE IN MALTA

David Grima

Introduction

This dissertation is aimed at emphasizing the risks of environmental hazards associated with Pharmaceutical waste (Croner 1988). Before tackling such a problem, one needs to identify the criteria that classify a particular waste as a Pharmaceutical waste, the sources of origin, the legislation concerned, and appropriate disposal and management systems which can be employed to ensure safety. The geographical nature of the Maltese islands is considered and decisions regarding improvement of the present situation are taken on account of this, utilizing techniques practised abroad. Therefore a survey was carried out to have an insight of the relative amounts of the various categories that constitute Pharmaceutical waste, the method of disposal, as well as the Pharmacist's opinion towards a proposed campaign about safe disposal of medicines (Graham 1985) aimed at renovation of the present situation.

Methodology

A set of surveys was carried out aimed at obtaining precise but general information about Pharmaceutical waste production in Malta. It is evident, from the attempt of defining hazardous waste that this is not an easy task (Croner 1988) and therefore, Pharmaceutical waste was divided into two, for simplicity. The first group characterized by waste presented as expired, unused and/or substandard Pharmaceutical preparations, while the second group comprising chemicals of no further economic value, which are used in any one or more of the processes involved in the production of Pharmaceutical products.

Thus, due to variations attributed to factors such as originating source, quantity or management process, three surveys were necessary:

Survey 1

A questionnaire was sent by post to every pharmacy in Malta and Gozo (n=168). It comprised a proposed campaign promoting safe disposal of unwanted and expired Pharmaceutical products, implicating both the pharmacist's and the Health Department roles. The Pharmacist's response towards this new approach was investigated.

Questions about patient's frequency of returning expired medicines, Pharmacist's advice to the patient concerning disposal, and way of disposal of such a stock by the pharmacist was investigated.

Survey 2

This involved the collection of data regarding quantity and nature of the Pharmaceutical waste, originating from all governmental entities i.e. hospitals and polyclinics. Records involved waste products expiring in the years 1989, 1990 and 1991. Such information was made available through the Medical Stores Survey list which comprised information about batch numbers, drug's chemical and generic name, dosage form, dose, quantity and expiry date - (month and year).

Survey 3

A detailed questionnaire regarding chemical and Pharmaceutical waste carried out in collaboration with the Secretariat for the Environment, was sent by post to a sample of thirty (30) companies in Malta classified under the "chemicals and cosmetics" industrial sector. Thirty to forty-five minutes discussion sessions with the plant manager were set up to evaluate the problem of disposal and collect data utilizing the questionnaire as guidelines.

Investigation

A model to determine the effect of soil moisture on powdered Paracetamol tablets (500mg) were set up. The aim of this study is to predict any hazards, associated with the dumping of Pharmaceutical waste in soil. A batch of soil was divided into three samples, the moisture of which was adjusted and recorded. 0.15mg of finely powdered Paracetamol tablets (as stated by the B.P.) were added to every 7.5g of soil, this being a practicable weight for carrying out the test. The assay was performed every 4 weeks, in duplicate, using the U.V. Spectrophotometer to detect any change in the active ingredient concentration.

Results

Survey 1

51 Pharmacists out of 168 (30%) answered the questionnaire. When asked to classify the frequency of return of waste Pharmaceutical products, nil replied frequent, 16 replied occasional, 17 rare and 19 never. 31 Pharmacists felt the necessity to accept Pharmaceutical waste at their own Pharmacy, while 25 Pharmacists were capable of suggesting a method for disposal. When asked about the disposal system, 40

Pharmacists replied that they return expired and unwanted products to the agent, 13 utilized a governmental disposal scheme, none of them contracted a private disposal company, while 19 suggested other methods. Of those who answered the questionnaire, everyone wished to participate in the proposed campaign for safe disposal of medicines, while 11 of these expected some kind of remuneration for this service in the campaign.

Survey 2

The data obtained was analyzed and divided into categories according to the various dosage forms i.e. solid, semi-solid, liquid and aerosols. Each category was then divided into sections according to the legislative requirements regarding the dispensing of the Pharmaceutical product, i.e. Over the Counter (O.T.C.), General Practitioner (G.P.), Consultant (*), designated (**) and Green Prescription Form (G.P.F.) drugs.

N.B. Liquid dosage forms were divided into two, on basis of volume content.

Pharmaceutical waste in the aerosol form was found to be negligible (12 containers).

Survey 3

The data collected was analyzed: it primarily included solvent, acidic and caustic types of waste. From the sample of thirty industries investigated, the following approximate amounts of waste were generated -

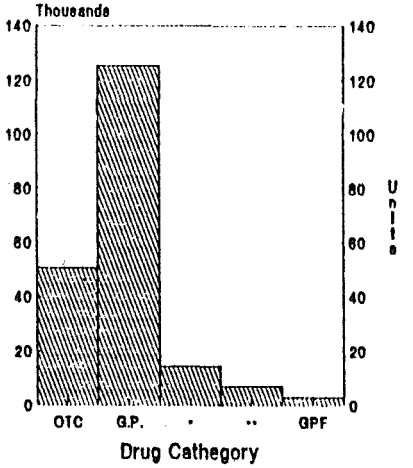
i. 25,000 litres per annum of Solvent Waste (Mainly Organic);
ii. 4,000 litres per annum of acidic waste; and
iii. 8,500 litres per annum of caustic waste.

The method of disposal were found to be varied, depending mostly on the quantity and quality of waste.

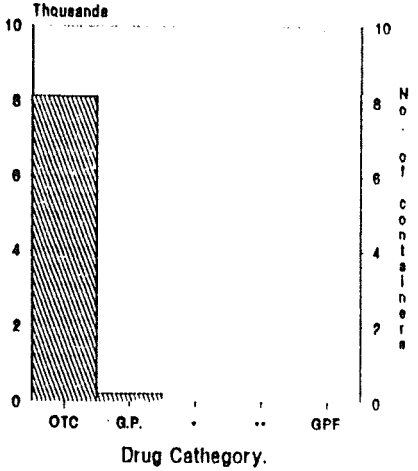
Investigation

The following are the rate constant values for the degradation of Paracetamol: 4.4×10^{-4}, 1.5×10^{-3} and 4.1×10^{-3}/day for soil moisture 0%, 10.87% and 15% respectively. First order degradation kinetics i.e. log

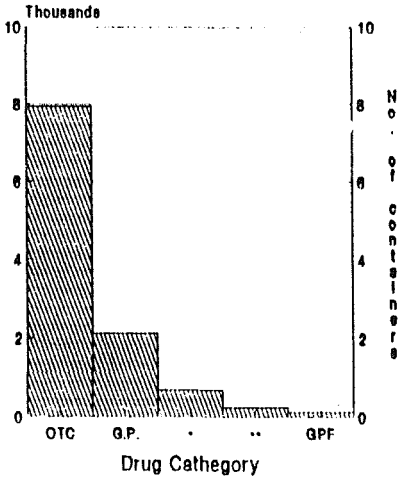
Solid dosage forms
(Tablets and Capsules)



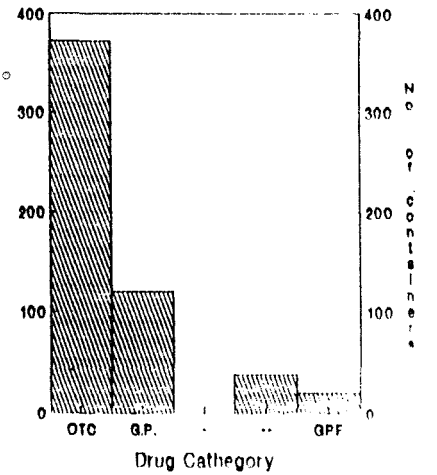
Semi-Solid preparations
(Creams,Lotions and Ointments)



Liquid dosage forms (1)
(Injections,Phials and Drops)



Liquid dosage forms (2)
(Syrups,Suspensions and Nutrition ppns)



absorbance, were incorporated to obtain these values. The results suggest that the rate of Paracetamol degradation increases in a non-linear mode - exponentially - as the soil moisture increases.

Discussion

It is evident, from the response obtained in the questionnaires, that there is ample room for improvement as regards the management of Pharmaceutical wastes in Malta. One must note that the present situation in Malta cannot be attributed to one factor or another, but is the result of mismanagement in a combination of sectors. An improvement can be achieved by promoting both the interest and initiative of the Pharmacist and the other health educators. The Pharmacist most often acts as both the waste producer - being a scientist - as well as waste manager - being a primary healthcarer. Improvement in attitude can be achieved by the active participation in organised fora and discussions aimed towards a more serious management, involving also the public in general, who is also greatly involved in this field. Further consolidation of this strategy is the setting up of legislation, comparable with the EEC regulations, that guarantee fruitful results if well practised. However, the facilities that permit efficient disposal, both in an environmental and economic point of view are of utmost importance.

Therefore, consultations with European and Non-European waste disposal techniques are recommended, to select the most appropriate ones for Malta - although treatment in advanced technology incinerators is always the most recommended procedure to dispose of Pharmaceuticals (E.P.A. 1989).

References

Burgess J.E., Gillies A. Hazardous Waste Disposal Guide. Croner Publications Ltd. First Edition 1988; 3: 3-37.

Graham P. Medidrop: A campaign designed to inform the general public about the dangers of keeping old and out of date medicines in the home. Health Promotion Branch: A.C.T. Health Authority Canberra; 1985; 1-34.

Robinson B. Manual for the Management and Disposal of Biomedical Wastes. Biomedical Waste Unit, Environment Protection Authority, Victoria, 1989; 268: 12.